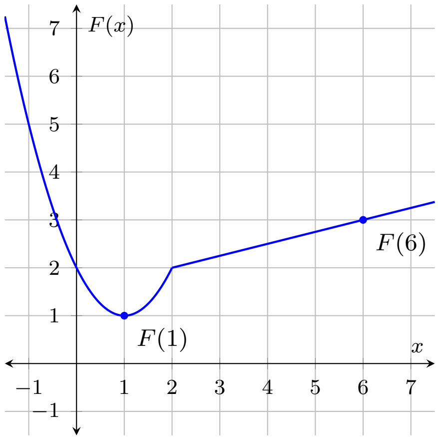
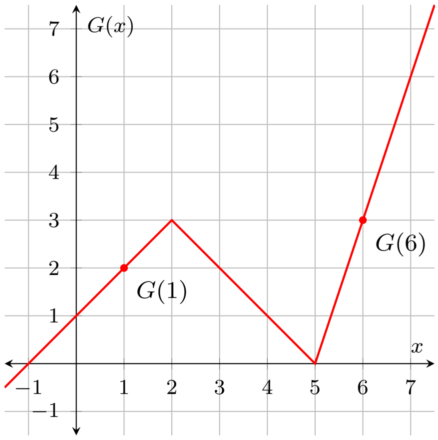
The graphs of the functions $F(x)$ and $G(x)$ are below. Let $P(x) = F(x)G(x)$ and $Q(x) = F(x)/G(x)$.



(a) The graph of $F(x)$.



(b) The graph of $G(x)$.

You need to know the *product rule* and the *quotient rule*, two very important formulas for calculating derivatives. They are given by

$$P'(x) = F'(x)G(x) + F(x)G'(x)$$

and

$$Q'(x) = \frac{F'(x)G(x) - F(x)G'(x)}{[G(x)]^2}.$$

We first want to determine $P'(1)$ and $Q'(1)$, so we are essentially analyzing $F(1)$ and $G(1)$. From looking at the graphs, we can see that $F(1) = 1$ and $G(1) = 2$. Since $F(x)$ appears to have a minimum value at $x = 1$, we know that $F'(1) = 0$, and from finding the slope of the line we can see that $G'(1) = 1$. So

$$P'(1) = F'(1)G(1) + F(1)G'(1) = (0)(2) + (1)(1) = 1$$

and

$$Q'(1) = \frac{F'(1)G(1) - F(1)G'(1)}{[G(1)]^2} = \frac{(0)(2) - (1)(1)}{2^2} = -\frac{1}{4}.$$

It's the same idea for $P'(6)$ and $Q'(6)$. We have $F(6) = 3$, $G(6) = 3$, $F'(6) = 1/4$, and $G'(6) = 3$, so

$$P'(6) = F'(6)G(6) + F(6)G'(6) = (1/4)(3) + (3)(3) = \frac{3}{4} + 9 = \frac{39}{4}$$

and

$$Q'(6) = \frac{F'(6)G(6) - F(6)G'(6)}{[G(6)]^2} = \frac{(1/4)(3) - (3)(3)}{3^2} = \frac{1}{12} - 1 = -\frac{11}{12}.$$